

CHAPTER V

CONCLUSION

The separation of the 16 priority pollutants PAHs i.e., Acenl, Acent, Ant, BaA, BaP, BbF, BkF, Bghi, Chry, Dah, Flu, Flt, Ind, Naph, Phen, and Pyr was studied. The two types of the analytical columns, monomeric type and polymeric type, were interested for this study. The results showed that the separation was achieved only on the polymeric C₁₈ phase column. Moreover, the response of each PAHs were good linear in the range of 0.1-100 ppm.

A small disk extraction method (I.D. 13 mm) was the alternative SPE method that has been developed in this study. It was applied to isolate 16 PAHs from water samples followed the EPA method 550.1 with many advantages. First, it was the cost-effective method because the small C₁₈ disks were used instead of the commercial C₁₈ disks (I.D. 47 mm). Each commercial disk could cut to seven small disks and only inexpensive tools was required for cutting disks. Second, it required small volume of organic solvents for the eluting step. Third, the cost for waste treatment was diminished due to the reduction of toxic solvent use. Forth, it was time-saving method because elution step was minimise. Besides, the evaporation step and cleanup step were also eliminated. At last, this method could multiply the concentration of PAHs in water samples with 200-fold. So that, the trace PAHs could be analysed.

The efficiency of this sample preparation method was improved by the addition of 2-propanol or Brij-35. In this study, Brij-35 was selected because of non-toxic. It was found that 0.30 mM Brij-35 was the best solubilizer concentration to increase the solubility of PAHs in studied conditions. Eluting solvent volume at 0.50 mL, 15 min of elution time and solution volume at 100 mL were chosen as the optimum conditions of this extraction method. This method could not determine Naph because of its breakthrough. Because the larger PAHs caught the most active sites of disk, the smaller PAHs were breakthrough. Naph was the earliest breakthrough compound because it was the smallest PAHs.

The method detection limit of Ant, BaP, BbF, BkF, Dah, Flu, Bghi, and Ind were 0.20 ppb. While, the method detection limit of Acenl, Acent, Flt, Phen and Pyr were 0.10 ppb. Moreover, the method detection limit of BaA and Chry were less than 0.01 ppb because they were higher sensitivity than other compounds at the optimum wavelength of each PAHs.

The spiked standard solutions (2.00 ppb) were used to study the percent recovery and precision of each PAHs with eleventh analysis. The percent recovery and the percent relative standard deviation for the determination of Acenl, Acent, BaA, BaP, BbF, BkF, Bghi, Chry, Dah, Flu, Flt, Ind, Phen, and Pyr ranged from 72.88-117.12% and 1.96-4.82%, respectively. While, the percent recovery of Ant was 55.09% and the percent relative standard deviation was 3.96%. The low recovery of Ant was due presumably to its structure. After elution, Ant could penetrate in the fibril network of disk because it is linear structure. Thus, loss of some Ant was occurred.

The accuracy of this method was evaluated by comparing the concentrations of each PAHs obtained from the analysis of unknown mixture solutions with their true concentrations (240 ppb) and it was indicated in form of percent error. The percent error of Acenl, Acent, Ant, BaA, BaP, BbF, BkF, Bghi, Chry, Dah, Flu, Flt, Ind, Phen, and Pyr were in the range of 0.65-9.58%.

Because the small disk extraction method had high precision, high accuracy, and minimum detectable level, it was applied to determine PAHs in real water samples. Fifteen water samples such as drinking water, natural mineral water, ice, tap water, and pool water collected from several places were analysed. The results indicated that all water samples were not found the interested PAHs.

This small disk extraction method was low-cost and did not complicate. So that, it could be recommended method for routine analysis. Moreover, it could be the further development of the EPA because the recoveries of all PAHs were in the range of EPA's acceptance except Ant and Naph. In addition, this extraction method could be modified to determine the other PAHs and the other pollutants in water samples or other samples. In the case of other pollutants, the optimum sorbent and eluting solvent would be considered.

RECOMMENDATION

According to the studied above, the author may suggest the recommended small disk extraction method for the determination of 16 PAHs :

1. In order to determine Naph, a small disk should be added in the holder to increase the capacity of disk. However, the amounts of eluting solvent (acetonitrile) must increase. Thus, it is cost-increment.

2. Due to the financial limit, the AR grade acetonitrile was used as mobile phase. So that, the chromatograms were high background and had many ghost peaks. If the HPLC grade acetonitrile had been used, the results would have been better.